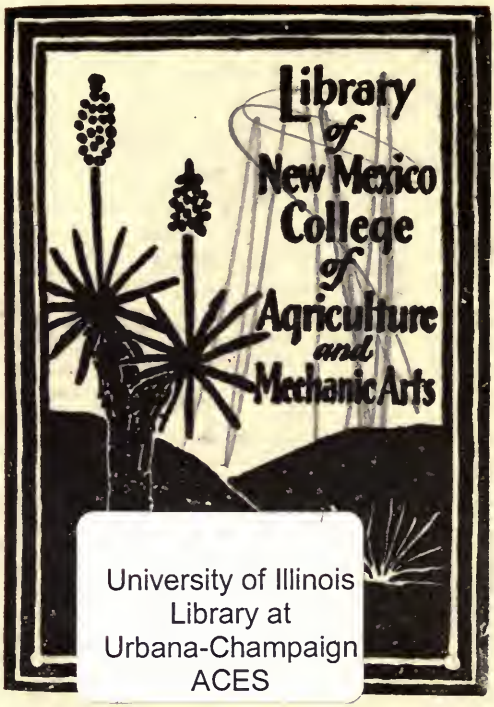

University of Illinois
Library at
Urbana-Champaign
ACES

UNIVERSITY OF ILLINOIS
AGRICULTURE LIBRARY

UNIVERSITY OF ILLINOIS
AGRICULTURE LIBRARY

SURPLUS
TO REQUIREMENTS AS
Superceded
Worn Out
Obsolete
Unbindable
Duplicated
NMSU LIBRARY
LAS CRUCES

UNIVERSITY OF ILLINOIS

Agricultural Experiment Station

BULLETIN No. 121

VARIETY TESTS OF WHEAT

By ALBERT N. HUME, O. D. CENTER,
AND LEONARD HEGNAUER

URBANA, ILLINOIS, JANUARY, 1908

Summary of Bulletin No. 121

The present data indicate that Turkey Red wheat is the highest yielding variety for Central and Northern Illinois. Page 76

Dawson's Golden Chaff has made the largest average yield next to Turkey Red. Page 73

Fulcaster and Harvest King are the best yielding wheats among those tested for Southern Illinois. Page 78

Frequent changes of seed wheat are not advisable; new varieties should be introduced only after thorough trial; home grown seed is likely to be most profitable for practical wheat growers. Page 81

Turkey Red and other Russian wheats described and illustrated. Page 84

Hungarian wheats. Page 88

Some American wheats described and illustrated. Page 88

VARIETY TESTS OF WHEAT

By ALBERT N. HUME, Associate in Crop Production, O. D. CENTER, First Assistant in Crop Production, and LEONARD HEGNAUER, Assistant in Farm Crops.

Some varieties of wheat are more productive than others. We are so accustomed to accept the statement that there is no "best variety" of wheat for the country at large that we may make the mistake of thinking the selection of the variety best adapted to a given locality is a matter of very secondary importance; but there is good evidence in this bulletin to show that wheat growers over the larger area of Illinois who select the best yielding variety may average several bushels an acre more wheat than those who select the second best.

No one can know by general observation in the field which the highest yielding varieties of wheat may be, because a difference of three to six bushels per acre is not in this way easily determined. The only way to ascertain the smaller differences in yield is by means of carefully conducted tests in the field. It is the purpose of this bulletin to give data which will assist wheat growers of Illinois to select the highest yielding varieties for their own localities. For central and northern Illinois comparative tests were made on the University experiment farm near Urbana, in Champaign County, and on the University crop experiment field located near DeKalb, in DeKalb County. For southern Illinois results are reported from tests made on the University crop experiment field near Fairfield, in Wayne County, and on the farm of Mr. W. E. Braden, near Cutler, in Perry County.

Plan of Experiment

On the University crop experiment fields, at Urbana, DeKalb, and Fairfield, the plan of these experiments has been essentially the same. On all three of the fields the variety wheats come into a rotation and therefore do not come two years in succession upon the same ground. All plots on these fields are two rods wide and sixteen rods long, thus containing one-fifth acre each.

In each "division" of the field are eighteen of these fifth-acre plots, the two middle ones, numbers 9 and 10, being "Standard Soil

Plots" and not entering into consideration in tests of varieties. The following plan, showing the names of the varieties, and plan of the plots at the Urbana field for 1905, may illustrate the general plan of all tests on these fields.

PLAN OF VARIETY WHEAT TESTS
Urbana Field, Year 1905

Series 200 Plot Nos. 261-278

Pesterboden	1	
Red Hussar	2	
Indiana Swamp	3	standard
K. B. No. 2	4	
Padi	5	
Indiana Swamp	6	standard
Beloglina	7	
Kharkov	8	
Indiana Swamp	9	(soil plot)
Indiana Swamp	10	(soil plot)
Rudy	11	
Hungarian	12	
Indiana Swamp	13	standard
Wheedling	14	
Malakoff	15	
Indiana Swamp	16	standard
Turkey Red	17	
Dawson's Golden Chaff	18	

It will be noted that in the above plan plots numbered 3, 6, 13, and 16 are all planted with exactly the same kind of wheat. These are called standard, or check, plots and their purpose is to indicate differences of soil fertility that are sure to exist. A method has been suggested that may eliminate to some extent effects of soil difference from variety tests for any given year; namely, first to assume that differences in soil fertility occur gradually from plot to plot and that the yields of the several variety plots shall be increased or decreased, in proportion as the yield of the nearest standard plots is lower or higher than the average of all the standards. In the present bulletin it will appear that such calculation has no great effect upon general conclusions.

VARIETY YIELDS FROM URBANA FIELD

Table 1 shows the actual yields in bushels (60 pounds) per acre for the years 1904-1907, inclusive, at Urbana. In case there was more than one plot of any variety, the average yield is given.

With a view to discover whether conclusions drawn from Table 1 would be greatly changed by adding or substracting the increase or decrease for the several plots, which would theoretically neutralize differences of soil fertility, we have constructed Table 2.

TABLE 1.—YIELDS OF VARIETY WHEAT, EXPERIMENT FARM, URBANA

Name of variety.	Actual yield per acre, (bushels).				
	1904.	1905.	1906.	1907.	Four-year average.
Turkey Red	32.1	30.0	46.6	45.5	38.5
Malakoff	31.4	27.7	46.4	45.5	37.7
Hungarian	18.9	29.0	36.0	42.4	31.6
Dawson's Golden Chaff	16.8	25.1	36.4	47.5	31.4
Rudy	12.7	27.9	38.2	43.9	30.7
Indiana Swamp	12.8	28.7	37.0	41.6	30.0
Wheedling	15.2	25.5	40.2	38.5	29.8
Poole	7.8				
European	11.9				
Jones Longberry	10.4	26.6			
Satisfaction	13.8	24.3			
Red Hussar		24.0	40.7	44.2	
Beloglina		30.8	37.0	41.1	
K. B. No. 2		22.3	40.5	40.2	
Pesterboden			41.1	43.8	
Kharkov			39.1	43.6	
Padi			35.2	32.5	

TABLE 2.—COMPUTED YIELDS OF WHEAT VARIETIES, GROWN AT URBANA. CALCULATED BY INCREASING OR DECREASING THE ACTUAL YIELDS IN PROPORTION AS THE YIELDS OF THE NEAREST STANDARD PLOTS WERE LESS OR GREATER THAN THE AVERAGE OF ALL STANDARD PLOTS FOR THE YEAR

Name of variety.	Computed yield per acre, (bushels).				
	1904.	1905.	1906.	1907.	Average.
Turkey Red	34.1	30.0	44.7	45.6	38.6
Malakoff	28.1	28.0	46.6	45.5	37.1
Dawson's Golden Chaff	17.4	26.7	34.5	47.9	31.6
Hungarian	20.0	26.9	37.0	42.2	31.5
Rudy	13.5	27.6	41.2	43.8	31.5
Wheedling	12.6	26.4	42.4	38.3	29.9
Indiana Swamp	10.5	27.6	36 9	42.8	29.5
Poole	8.3				
European	13.4				
Jones Longberry	11.2	27.8			
Satisfaction	13.0	22.2			
Red Hussar		25.2	37.8	44.9	
Beloglina		30.1	38.0	40.5	
K. B. No. 2		22.3	38.6	40.3	
Pesterboden			38.1	44.4	
Kharkov			42.1	43.1	
Padi			34.4	33.5	

It will require further time to determine whether the method employed in the calculation of Table 2 from actual yields given in Table 1 is of great utility. The writers realize that in order to get the most accurate averages, many tests should be employed so that differences of soil and climate equalize themselves. In the present case, however, it appears by consulting Tables 1 and 2 together that Turkey Red, Malakoff, and Dawson's Golden Chaff, are, in order named, the highest yielding varieties by either table. Moreover, with the lower yielding varieties the computation used in Table 2 does not change the rank of any variety more than one place. Thus it is possible to arrange in the following tabular form the seven varieties that have been tested throughout the four years at Urbana; this arrangement is compiled from both tables:

Name of variety.	Rank of varieties tested four years at Urbana, according to yield per acre.
Turkey Red	1
Malakoff	2
Hungarian or Dawson's Golden Chaff	3
Dawson's Golden Chaff or Hungarian	4
Rudy	5
Indiana Swamp or Wheedling	6
Wheedling or Indiana Swamp	7

Turkey Red and Malakoff, which are botanically the same, have yielded 7.9 and 6.1 bushels (actual yield) more wheat per acre as an average of four years than any other variety tested at Urbana, and by the computed yields these results differ by only a fraction of a bushel.

YIELDS OF WHEAT FROM FOUR SOIL EXPERIMENT FIELDS

In connection with soil fertility tests on experiment fields at Galesburg, Virginia, Bloomington, and Sibley, it has been possible to secure, incidentally, yields of four different varieties of wheat, from separate localities, for the same year. These cannot be considered as comparable, but they indicate what these varieties may do under the conditions, and are of interest when read in connection with yields from the Urbana field.

At the Galesburg experiment field in Knox County, in the Upper Illinois Glaciation, on ordinary untreated prairie soil the variety Indiana swamp produced 39 bushels per acre in 1905.

The yield of Turkey Red wheat at Sibley, Ford County, in the Early Wisconsin Glaciation, in 1905, was 29.5 bushels per acre on untreated land.

At Bloomington, McLean County, in the Early Wisconsin Glaciation, Dawson's Golden Chaff wheat was used. The yield in 1905 on untreated land was 30.8 bushels per acre.

At Virginia, in Cass County, which is in the Middle Illinois Glaciation, the soil plots were sown with Hungarian wheat, and the yield from the untreated land was 29.8 bushels per acre in 1905.

It is of interest to mention that on the plots fertilized with phosphorus in connection with nitrogen (either applied directly or secured by growing legumes) the yields of wheat in 1905 were 40.6 bushels per acre at Galesburg, 45.2 bushels at Sibley, 50.9 bushels at Bloomington, and 36.0 bushels at Virginia. (For other details and methods of soil improvement see Illinois Experiment Station Circulars 96, 100, and 108.)

The following makes a comparison easy:

Name of variety.	Yield at Urbana, 1905.	Other yields in 1905.		
		Locality.	Land untreated.	Land fertilized.
Indiana Swamp	28.7 bu.	Galesburg	39.0 bu.	40.6 bu.
Turkey Red	32.1 bu.	Sibley	29.5 bu.	45.2 bu.
Dawson's Golden Chaff	26.2 bu.	Bloomington	30.8 bu.	50.9 bu.
Hungarian	18.9 bu.	Virginia	29.8 bu.	36.0 bu.

TESTS AT DEKALB

On the crop experiment field established near DeKalb, in DeKalb County, one division of eighteen fifth-acre plots was devoted to wheat in 1907. The following table shows in one column the actual yields in bushels (60 pounds) per acre for each variety, and also the yield increased or decreased according as the nearest standard plots yielded less or more per acre than the average of the four standards.

TABLE 3.—YIELDS OF VARIETY WHEAT—DEKALB, 1907

Number of plot.	Name of variety.	Actual yield per acre, (bushels).	Computed yield per acre, (bushels).
221	Turkey Red	24.3	25.9
222	Padi	18.6	20.2
223	Indiana Swamp	18.6	20.2
224	Dawson's Golden Chaff	17.6	19.1
225	Red Fife	16.3	17.7
226	Indiana Swamp	19.0	20.2
227	Minnesota No. 163	16.7	17.6
228	Minn. Winter Wheat	25.6	26.2
231	K. B. No. 2	21.8	22.1
232	Malakoff	22.1	22.1
233	Indiana Swamp	20.7	20.2
234	Kharkov	29.5	28.3
235	Minnesota No. 169	17.6	15.7
236	Indiana Swamp	22.7	20.2
237	Kubanka No. 4	12.3	9.8
238	Wheedling	17.8	15.3

In connection with variety tests of wheat made in the northern section of Illinois, results from the Iowa Experiment Station have considerable bearing because Iowa is very comparable to this section of Illinois so far as soil and climate are concerned. In Iowa Experiment Station Bulletin No. 51 a one-year test of fourteen varieties of winter wheat is reported. The four highest yielding varieties in order were Turkey Red, Bearded Fife, Buda Pesth and Bulgarian.

From summarizing the evidence of these trials of wheat, at Urbana, DeKalb, and at the Iowa Experiment Station, the conclusion is justified that *the variety of wheat ordinarily known as Turkey Red is the most promising. In all these trials it has averaged best or among the best.* It seems there are several strains of this variety of Russian wheat, all of which are doing about equally well in this part of our state. Characteristics of varieties are discussed somewhat later in this bulletin.

TESTS IN SOUTHERN ILLINOIS

Variety tests of wheat have been conducted at two different points in Southern Illinois, at Cutler, in Perry County, and at Fairfield, in Wayne County. The Cutler field is located on the farm of Mr. W. E. Braden and has been operated in connection with soil experiments at that place. The tests have been directly supervised by Mr. J. E. Readhimer, Superintendent of Soil Experiment Fields. The tests of wheat were started in 1902 and have been continued since, so the average yields are valuable data. The following table summarizes the yields at Cutler:

TABLE 4.—YIELDS OF VARIETY WHEAT AT CUTLER, 1902-1907
BUSHELS PER ACRE (60 lb.)

Name of variety.	1902.	1903.	1904.	Three year ave.	1905	1906.	1907.	Three year ave	Six year ave.
Fulcaster (Home)	16.4	9.0	15.0	13.5	12.8	21.9	23.7	19.5	16.5
Harvest King (Home)	16.3	14.8	15.6	15.6	11.5	20.6	17.7	16.6	16.1
Red Fultz (Home)	15.3	7.7	15.3	12.8	12.6	21.9	18.3	17.6	15.2
Eclipse (Home)	16.8	5.4	13.7	12.0	10.7	22.9	20.2	17.9	14.9
Harvest King (Indiana)	10.9	10.5	13.8	11.7	11.6	22.5	18.5	17.5	14.6
Hybrid Beechwood	11.9	9.0	12.8	11.2	11.0	22.7	18.3	17.3	14.3
European	11.6	6.4	13 3	10.4	11.0	19.2	20.4	16.9	13.6
Harvest King (Michigan)	14.3	5.5	12.7	10.8					
Poole	12.1	5.2	13.6	10.3					
Jones Longberry (Home)	16.0	4.3	10.3	10.2					
Dawson (Michigan)	11.4	6.3	11.2	9.6					
Fultz (Tennessee)	10.2	4.0	11.8	8.7					
Fultzo-Mediterranean	12.5	1.7	11.4	8.5					
Indiana Swamp	11.0	3.2	11.3	8.5					
Jones Longberry (Indiana)	6.0	3 5	8.8	6.1					
Turkey Red			11.4		9.0	13.8			
Beardless Rural New Yorker.					9.3	18.2	18.0	15.2	
Knight & Bostwick No. 2					8.7	15.6	16.8	13.7	

By referring to Table 4 it will be noted that the trials were begun in 1902, and that after three years those varieties manifestly not adapted to the locality were discontinued from the test. The varieties thus dropped were Jones Longberry, Indiana Swamp, Fultz (from Tennessee), Fultzo-Mediterranean, Poole, and Dawson. Some of these are among the oldest and highest yielding varieties of wheat grown elsewhere. More recently a three-year trial was made of Turkey Red. Here was one case where one needed only to observe the plots as they grew, to tell that this Russian wheat, the best yielder farther north, was out of its element in southern Illinois.

It would be reasonable to assume the best average varieties in yield for six years were, in order, Fulcaster, Harvest King, and Red Fultz.

In the next to the last column are averages for the last three years. Apparently the actual average yield of the varieties was much affected by differences in season, for in the case of every variety for which we have both of the three-year averages the average yield for the last three years has exceeded that of the three years previous. This emphasizes the necessity of making variety tests under comparable conditions. If, for instance, one variety is tested for three seasons, and another variety tested three different seasons, the difference may be great, and the results not comparable. If results of the last three years were taken as conclusive we would place home-grown Harvest King seventh in order among the nine varieties tested, while by the previous three-year average shown in column four this variety would be given first rank among fifteen kinds of wheat tested in the same years.

Aside from the position of home-grown Harvest King, no variety would be greatly changed in rank by using either one of the three-year averages or the six-year average. It is apparent that the averages for the longer term are the more trustworthy.

These yields from Cutler illustrate somewhat forcibly that "home-grown" seed wheat may be as good or better than seed brought from a distance. Thus it may be observed that Harvest King seed that had been grown at Cutler for a number of years and used continuously since 1902 averaged 15.6 bushels per acre during the first three years, while seed introduced from Indiana in 1902 averaged 11.7 bushels. In each of the three years, 1902-1904, home-grown seed outyielded the Indiana seed. In the later years the seed which came from Indiana yielded as well as the other, indicating that it may have become acclimated. The question of source of seed will be discussed further.

TESTS AT FAIRFIELD

In the fall of 1905 when a crop experiment field had been established at Fairfield, in Wayne County, variety tests of wheat were included in the regular rotation there. The general plan was to include some varieties already grown successfully in the locality, some varieties that had done well at Cutler, those that were promising in tests at Urbana and good varieties that might be secured from other sources. The following table gives the results in actual yields of the trials in 1906 and 1907.

TABLE 5.—YIELDS OF VARIETIES OF WHEAT, RAISED NEAR FAIRFIELD, ILLINOIS—1906-1907

Name of variety.	Source of seed.	Yield, bushels per acre, (60 lb.)	
		1906.	1907.
Harvest King	Cutler	3.4	16.8
Rudy	Urbana	2.8	16.5
Fulcaster	Cutler	3.0	16.3
Wheedling	Urbana	6.8	16.1
Dawson's Golden Chaff	Urbana	3.3	13.2
Smooth Wheat	Native	6.2	13.0
Indiana Swamp	Galesburg and Urbana	2.3	12.3
Red Hussar	Urbana	2.6	11.4
Turkey Red	Urbana	1.4	11.0
K. B. No. 2	Urbana	4.5	10.2
Malakoff	Urbana	2.2	8.4
Theiss	U. S. Dept Agr. (12004)	1.1	6.6

These yields from the Fairfield field covering only two years are inconclusive except as they substantiate results secured at Cutler. The wheat crop was so nearly a failure in 1906 that no attempt is made to average the yields of the two years. It has, however, been evident to all who looked at the variety wheat plots at Fairfield that Harvest King and Fulcaster are comparatively well adapted to the locality, as the yields in the above table and at Cutler clearly demonstrate. Another thing is just as well borne out, namely, that the Russian wheats, Turkey Red and Malakoff, and the Hungarian, Theiss, are unsuited to the southern Illinois conditions, however well they do farther north.

It will be noted that all wheat yields reported for southern Illinois are small as compared with the yields obtained in the central and northern part of the state. Attention is called to the fact, however, that with good soil treatment very satisfactory yields of wheat have been secured on the soil experiment fields in southern Illinois. Thus, as an average of the last four years on the Odin soil experiment field, in Marion county, the yield of wheat has been 11½ bushels an acre on ordinary untreated prairie soil, but where green manures have been used the average yield of wheat has been 14 bushels, while with lime and green manures the yield has averaged

18½ bushels, and with lime and phosphorus in connection with green manures the average yield of wheat during the four years has been 27 bushels an acre.

(For more detailed information relating to the improvement of southern Illinois soils, see Illinois Experiment Station Bulletins 99 and 115, and Circulars 108 and 110.)

SOURCE OF SEED

The impression seems to have gained very general credence that wheat "runs out" when the same strain is kept for many years on the same farm. No doubt much of the reason for the acceptance of this theory can be found in the experience of very careless farmers who continue year after year to sow poorly selected and poorly cleaned wheat and on poorly prepared land. Such farmers fail to use the fanning mill, so with each succeeding season their seed wheat is made up more and more of light, immature kernels, and inert matter. As the years go by their land loses its fertility, and as the wheat yield grows smaller from this cause, the careless farmer assumes that something constitutional is the matter with his wheat variety. The thinner the land and the poorer the growth of wheat, the greater will be the growth of weeds; and these not being removed reduce the yield still more. Finally the careless wheat grower may be induced to buy some clean, plump, vigorous seed wheat, and, as might be expected under such circumstances, the yield is noticeably better, particularly when as is often the case the new variety is put in choice ground. It is too often assumed that such improvement has been due to the fact that the new seed came from a distance, when in most cases a similar improvement might have been made by vigorous use of the fanning mill on seed grown close at hand. But the man who grows wheat badly is the man who thinks incorrectly, and who proceeds to publish abroad without qualification that change of seed is necessary to successful wheat growing. The same kind of man would no doubt insist that "wheat would turn to cheat, for he has seen it do so on his own farm." The same kind of men will continue to enhance the profits of unscrupulous dealers who advertise in unreasonable terms and make no serious pretense to carry out their claims.

If then it appears that the Russian wheats are best for the northern part of Illinois and that Fulcaster and Harvest King are best for southern Illinois, where shall seed be purchased? In order to give a definite answer, and give reasons later, we will say: Buy it in Illinois if possible and preferably in your own community. By so doing one is more likely to get the kind of wheat he asks for, avoiding at the same time the expense of a long shipment. These are good reasons why practical farmers may well secure seed wheat

in their own community, especially when evidence is obtainable from this and other experiment stations to show that home-grown seed will generally yield as high or higher than foreign-grown seed.

It is to be regretted that sometimes seedsmen are over enthusiastic in writing advertisements. Where such is the case buyers must suffer and also the business of careful seeedsmen. One advertisement is quoted:

"CHANGE YOUR SEED WHEAT."

"It is now a conceded fact, known by every practical, up-to-date wheat-growing farmer, verified by every experiment station in the country, that wheat grown from the same seed, year after year, in the same locality, climate, and soil, deteriorates—declines and finally runs out. One of the surest methods of counteracting deterioration is by frequent changes and importations of new seed from regions and localities where the climate and other environment give strength, vigor, and vitality, under such a change."

So far as such a statement may lead a wheat grower to make a very uncertain change of seed wheat, it is harmful, and not likely to do permanent good for any one concerned. It reads as if the writer were unacquainted with the facts and in order that Illinois wheat growers may be correctly informed some data are cited from this and other stations relative to the changing of seed wheat.

When the tests were begun at Cutler (Table 3), in 1902, three strains of Harvest King were secured, one of which had been grown for some time in the locality of Cutler, one from Indiana, and one from Michigan. During the three years, 1902-1904, while all these strains were produced in the same series of tests the home-grown Harvest King outyielded in all instances either of the foreign strains.

After many years of testing variety wheats in Indiana, Professor W. C. Latta, concludes in Bulletin 72 of Indiana Experiment Station that "Standard varieties of wheat have maintained their yield and quality for fifteen years on the same soil;" and further, "Most of the new varieties have failed as a rule to do as well as standard varieties which have long been grown here."

Further, in Indiana Bulletin No. 41, we find a trial reported as follows: "Changing seed wheat from the soil of the Station farm to other parts of the state for one year and then back again to the Station had no appreciable effect upon the yield or weight of grain."

The Maryland Experiment Station exchanged several well known varieties of seed with the Kansas Experiment Station. These two strains of seed were sown side by side in six double plots. The yields did not show differences depending upon source of seed. The conclusion given in Maryland Bulletin No. 14 states: "The result of the year's work indicates that there is no benefit to be derived from obtaining seed wheat from a distant locality in the same latitude."

Professor H. L. Bolley, of the North Dakota Experiment Station, after a careful original study and after citing many references, concludes: "Different samples of seed of the same variety which were grown upon different soils, under like climatic conditions, will produce a like crop when seeded under sameness of conditions. .....It is not demonstrated that any advantage is gained by the use of seed previously grown under different climatic conditions than those under which it is to be used.....Failure often results from injudicious seed exchange." North Dakota Report for 1900 shows that home-grown wheat yielded 2.5 bushels per acre more than the same varieties which had been grown at the Minnesota Station for from one to nine years.

The Nebraska Experiment Station Bulletin No. 72 reports a trial of representative samples of Turkey Red wheat (the most prolific winter variety in Nebraska) from four sources, namely, Kansas, Nebraska, Ohio, and Iowa. The Kansas seed yielded two bushels more per acre than the home-grown seed, but the Ohio and Iowa samples yielded less by 3.3 bushels and 5.3 bushels per acre, respectively.

There seems to be no adequate evidence to show that the practical wheat grower can hope for any gain from changing seed wheat, merely for the sake of changing. There is more likelihood of loss by a change than of making any practical gain. If there be any foreign variety as was Turkey Red, originally from the Crimea, that will give increased yields of wheat over established varieties, the experiment stations should find it by many series of tests. It is evident that few practical farmers can undertake such work with hope of definite result, when we reflect that as many as one thousand rather distinct varieties of wheat have been tried by the United States Department of Agriculture and the several experiment stations since 1895.

It should be clearly understood that what has been said and quoted does not mean that one should never buy seed wheat, and especially there is no wish to reflect upon reputable seed firms. The handling of seed for a profit is not only an honorable business, but it is one that the best thought of any man may dignify. A case in point might be the well known work of the Estate of Vilmorin in France. There are corn breeders in the corn belt of Illinois who with infinite patience and much expense are eliminating poor strains and keeping good ones, so that the general average of production may increase. Such receive all commendation which lies in our power to give.

There is a further legitimate line of the seed business separate from plant breeding. That is the business engaged in by those who purchase seed from reliable sources, and by thorough processes which the ordinary farmer cannot employ, on account of the expense involved, remove all weed seeds and inert matter, and separate out imperfect seed and resell the cleaned seed at a legitimate profit.

The farmers of Illinois who buy seed wheat under a statement that it is adapted to their conditions must have some assurance that the seller not only has good intentions, but also a knowledge of his business. When farmers have such confidence they will buy more seed wheat than heretofore. They will buy for the reason that few farmers have time and inclination to produce the very best strains of seed wheat on their own farms, finding it cheaper to purchase from reputable plant breeders, and dealers.

WINTER OR SPRING VARIETIES

In former years a considerable acreage of spring wheat was sown in our state. It is generally accepted that when winter varieties of grain can be found that will withstand the extremes of temperature they are more profitable. They not only yield more, but are more nearly free from disease and insect injury. Four of the plots in the trial at DeKalb this season were spring varieties. The ground was all prepared for sowing at the same time and in the same manner, but in the case of the spring varieties sowing was delayed till spring. The names of the spring varieties (Table 3) were Red Fife, Minnesota No. 163, Minnesota 169, and Kubanka. The average yield of these four plots of spring wheat was 15.6 bushels per acre. The average yield of all winter varieties in the test was 21.5 bushels per acre. It is possible that further trials will give higher yields for spring wheat in Illinois, but it is not likely that it will supplant the winter varieties. The areas of winter wheat sown in Iowa and Nebraska have increased largely during recent years. This would indicate that growing winter wheat is likely to be continued in Illinois.

CLASSIFICATION OF VARIETIES

A good deal of confusion exists relative to the names of the varieties of wheat. Sometimes two varieties are given the same name, although more often one variety bears several different names. It is not practicable for all wheat growers to analyze botanically the wheat they grow. It is suggested, however, that they be ready to furnish a description of any variety they grow according to

the following outline, adapted from "The Cereals in America" by Professor Thomas F. Hunt. This classifies all wheats into eight groups, according to three characteristics. It does not prevent a much more minute description when that is found desirable.

- Wheat
  - Bearded
    - Glumes* white
      1. Grain white
      2. Grain red
    - Glumes bronze
      3. Grain white
      4. Grain red
  - Beardless
    - Glumes white
      5. Grain white
      6. Grain red
    - Glumes bronze
      7. Grain white
      8. Grain red

In the following table the more important varieties discussed in this bulletin are classified according to the above outline.

TABLE 7.—CLASSIFICATION OF VARIETIES INTO GROUPS

Name of variety.	Bearded or beardless.	Glumes, white or bronze.	Grain, red or white.
Rudy	Bearded	White	Red
Malakoff	Bearded	White	Red
Turkey Red	Bearded	White	Red
Indiana Swamp	Bearded	White	Red
Fulcaster	Bearded	White	Red
Kharkov	Bearded	White	Red
Hungarian	Bearded	White	Red
Pesterboden	Bearded	White	Red
Jones Longberry	Bearded	White	White
	Bearded	Bronze	Red
	Bearded	Bronze	White
K. B. No. 2	Beardless	White	Red
Fultz	Beardless	White	Red
Wheedling	Beardless	White	Red
	Beardless	White	White
Harvest King	Beardless	Bronze	Red
Red Fultz	Beardless	Bronze	Red
Dawson's Golden Chaff	Beardless	Bronze	White

If all wheat raisers will acquaint themselves with the botanical characters of their varieties so far as may be possible and keep some record of them, it will be much easier not only to identify varieties by correspondence, but much confusion, which occasionally results from ignorance and otherwise, may be avoided.

In the classification of varieties above, the terms red and white applied to grain are made to conform as nearly as possible to the

*The term glume means the outer covering of the wheat grain. In popular language it may be read, chaff.

market grade of the same grain. The color of wheat grains shades from deep amber to nearly white, so it is evident that the division between white and red grain is not sharp.

Plant breeders differ somewhat regarding the importance of botanical purity of varieties of wheat. For present purposes it is certainly obvious that when a purchaser makes a mail order for a given variety of seed wheat he should be able to determine that he gets that which he orders and not something entirely different. The illustrations of typical wheat heads on the following pages are not intended for studies in variation, but to help impress the general characters of the most prominent varieties for northern and southern Illinois.

Moreover it is thought that if wheat growers can be made more familiar with the history and characteristics of the varieties they handle, it will increase interest in their work, and with increased interest will come increased efficiency.

RUSSIAN VARIETIES

TURKEY RED

The above name would imply that the variety of wheat so called might have originated in Turkey; very frequently the name is given as Turkish Red. So far as is known, such was not the origin and the name Turkey Red is in reality a misnomer. It would be more accurate to call it Crimean wheat for it originally came from that part of southern Russia. It was introduced into Kansas by the Mennonites about thirty-five years ago. A number of later importations have been made from Russia. It is a very widely grown variety. If the variety is objectionable in any way it is in two respects, (1) that the straw is not so strong as that of some other varieties, and (2) the awns make it exceedingly unpleasant to handle. This station nevertheless feels justified in recommending the variety, inasmuch as it has been raised at the Urbana field seven successive years without any serious effect of lodging at any time. It would seem that as time goes on the strength of straw of this valuable variety might be improved by breeding.

MALAKOFF

The Illinois Experiment Station began to test the variety of wheat named as above in 1904. The first seed was furnished to the Station by the Ratekin Seed Company of Iowa. The similarity between it and the common Turkey Red has always been remark-

able. The writers are unable to find any botanical difference between the two, and have begun to consider them identical. It is easily possible that they may have come from Russia in different importations. In fact this would seem a plausible explanation judging from the following statement given by J. W. Ratekin. "With regard to the New Malakoff wheat, would say we imported 35 bushels of it from Russia six years ago. It came from a point near the Black Sea. I cannot now tell you the Russian name of the town when translated into English—it was Malakoff—thus the name."

"We have grown Turkey or Turkish Red wheat for the past ten years—I think it was originally the same wheat as our Malakoff."

KHARKOV

This is another of the Russian wheats, reported by Professor M. A. Carleton as "received in 1901 through Dr. A. Boenicke, President of the Kharkov Agricultural Society, Kharkov, Russia. It is described as "a bearded, hard, red, winter wheat, similar to Turkish or Crimean, but coming from a region much farther north and therefore extremely hardy." This is the variety that gave the highest yield at the DeKalb field in 1907.

BELOGLINA

"This wheat was sent to the United States Department of Agriculture from Russia in 1901 by Hon. W. R. Martin, United States Consular agent. It is a hard, red, Russian wheat. It is said to come from the northern portion of the Staveopol Government, a region of great extremes of temperature and moisture." Botanically it is very similar to Turkey Red.

PADI

This appears to be a wheat that was introduced from Russia by E. A. Bessey in 1902. It does not resemble closely other Russian wheats grown at this experiment station, in that it is smooth instead of awned (bearded). It takes its name "Padi" from the place in Russia from whence it was sent to America, but is said by Bessey (Bureau Plant Industry Bulletin No. 66) to have originated from a Hungarian wheat. As stated below, however, ordinary "Hungarian" wheats are also heavily bearded, like the Russian wheats.

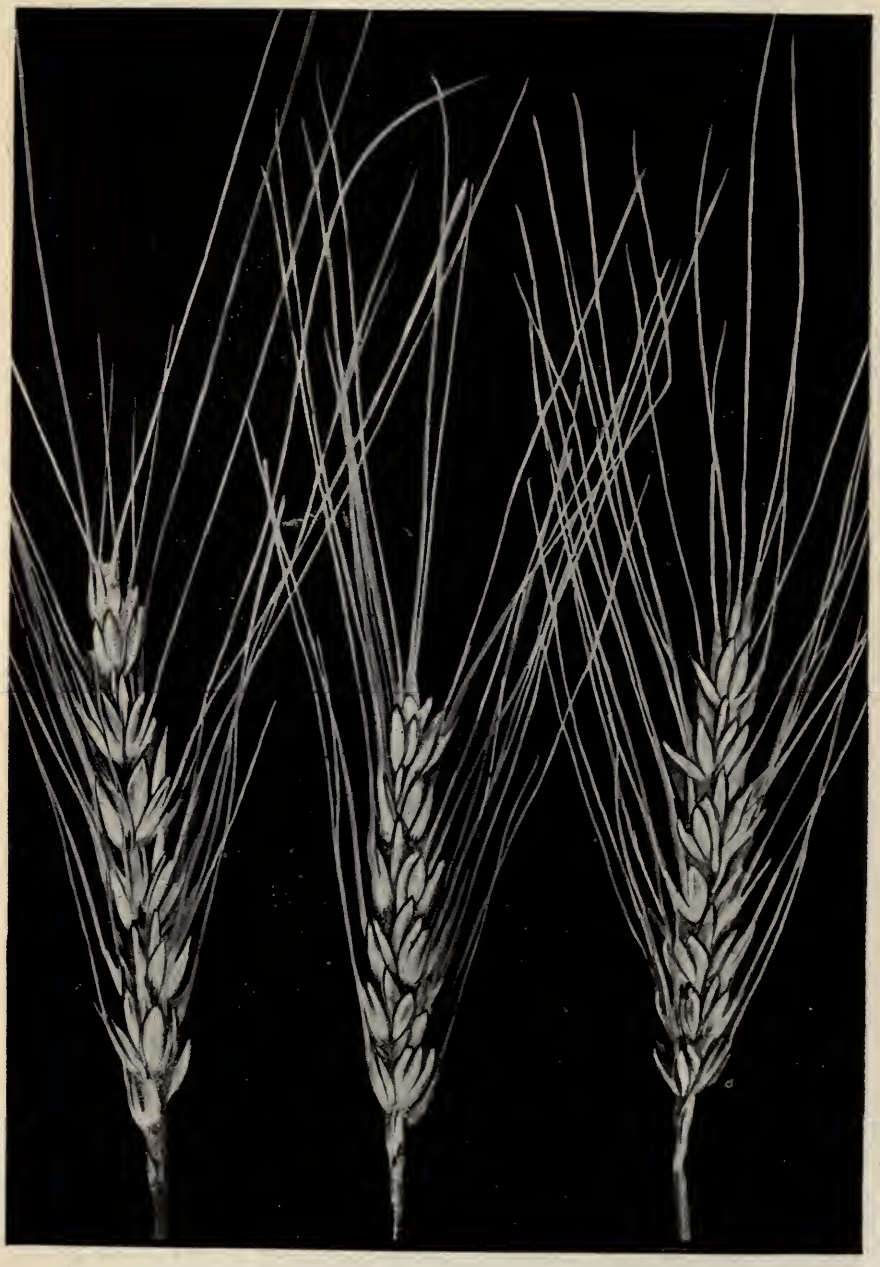

PLATE 1.—TYPICAL HEADS OF TURKEY RED. THIS TYPE OF WHEAT GAVE THE HIGHEST AVERAGE YIELD AMONG THE VARIETIES TESTED AT URBANA.

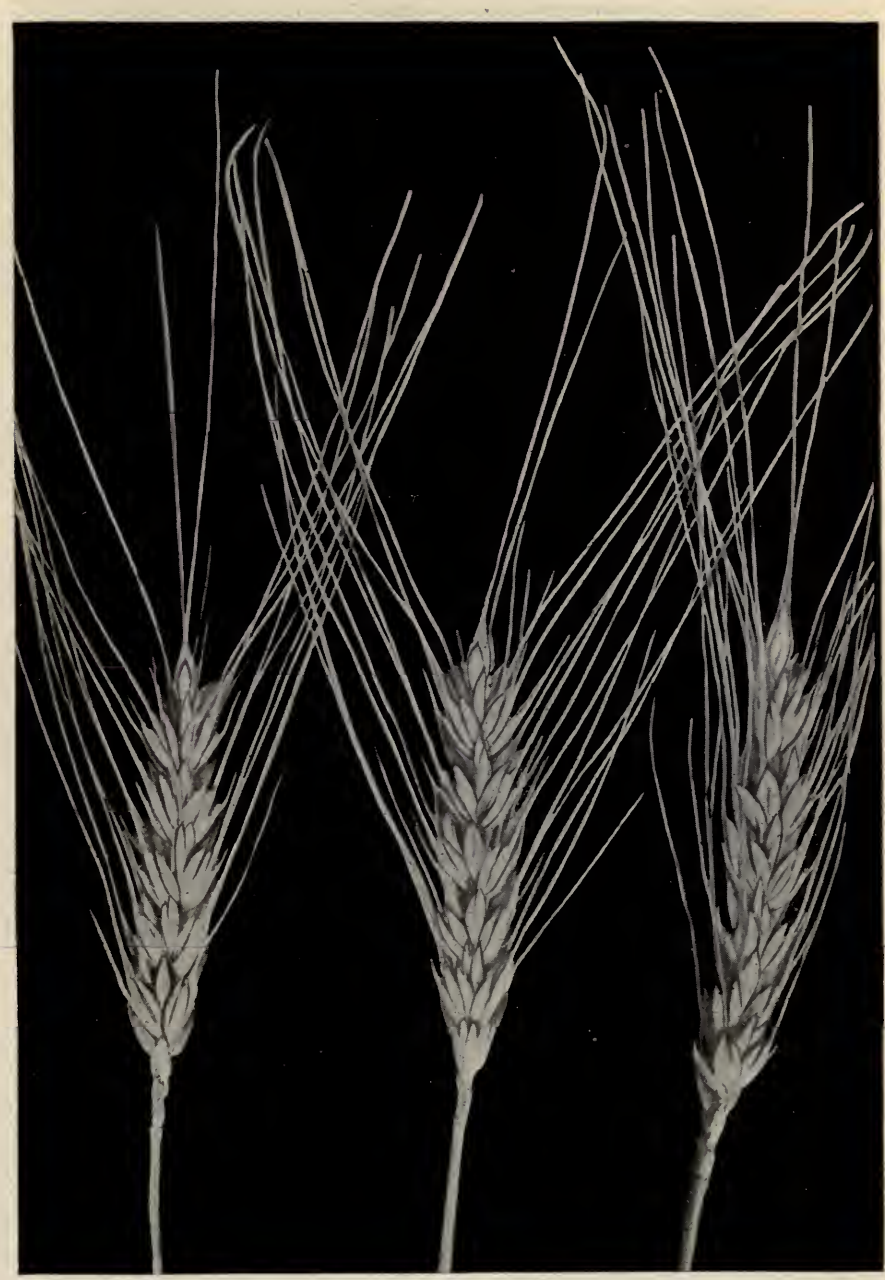

PLATE 2.—MALAKOFF. APPARENTLY THE SAME WHEAT AS TURKEY RED.

HUNGARIAN VARIETIES

There are several so-called varieties that bear the name "Hungarian," having been brought from Hungary. Like the Russian varieties they are heavily bearded, but differ from them, generally, in having whiter glumes and whiter, softer grain.

PESTERBODEN

This variety is one of a large number, introduced from Europe by the Bureau of Plant Industry of the United States Department of Agriculture. Professor M. A. Carleton writes that it was received September 27, 1900.

AMERICAN VARIETIES

DAWSON'S GOLDEN CHAFF

For the origin and history of Dawson's Golden Chaff, the writers are indebted to Professor C. A. Zavitz, Ontario Agricultural College. We take the liberty of quoting directly from a letter by Professor Zavitz to the writers.

"The Dawson's Golden Chaff variety of winter wheat was started evidently from a sport. Mr. Robert Dawson of Paris, Ont., had a field of the White Clawson wheat in 1881. The crop was very badly lodged. In walking over this field, Mr. Dawson found one plant which was standing quite well and evidently possessed much stiffer straw than the surrounding plants. This plant was of a different type from the old White Clawson variety. He saved the seed and sowed it in the spring of the following year. The variety became promising and a sample was secured at our Agricultural College, Guelph, and grown with other varieties. Amongst all the varieties grown, the crop proved to be the most attractive, possessed the stiffest straw, and gave the largest yield of grain per acre. It was named the Dawson's Golden Chaff in honor of Mr. Dawson who started the variety from one plant. After it was carefully tested at our College for a few years it was distributed throughout the Province in connection with our co-operative experimental work. As this variety gave good results on the various farms on which it was tested, its cultivation increased throughout the Province. Some seed was sent to Michigan, New York, and other states and it is now grown more or less in a number of the northeastern states. The grain is not as hard as some of the other varieties, and we are endeavoring to increase the quality of the grain

PLATE 3.—DAWSON'S GOLDEN CHAFF. THE WHEAT THAT GAVE THE SECOND HIGHEST AVERAGE YIELD ON THE URBANA FIELD.

and at the same time to retain the excellent straw and the high yielding quality through systematic selection and through cross-fertilization. The results so far are very encouraging."

FULCASTER

The wheat known as Fulcaster is pronounced one of the best known of varieties that have been originated in this country by crossing. S. M. Schindel, of Maryland, produced it in 1886, by crossing Fultz and Lancaster, hence, the name. So far as is known to this Station it is the highest yielding variety for the common prairie soil of Southern Illinois.

RUDY

Rudy is a good example of a variety that has been established through selection. The first distinct stool of this wheat was taken from a large field by Mr. M. Rudy, of Ohio, in 1871.

WHEEDLING

This variety was originated about eighteen years ago by Louis Wheedling, of Indiana. Mr. Wheedling, while walking in his wheat field, noticed some heads slightly different from the surrounding ones. These he selected and from them came the variety that bears his name. It is a wheat of exceedingly upright growth and stiff straw. It rarely lodges.

FULTZ

Perhaps the most widely known and most commonly grown smooth winter wheat in the United States is Fultz. It is among the oldest of distinct varieties, having been first selected in 1862 by Abraham Fultz, of Pennsylvania. It is said that he took the first heads of the variety from Lancaster, the latter variety being bearded. The original heads of Fultz may have resulted from a variation or a mixture. At any rate, they have been since selected and multiplied until Fultz wheat has become one of the standards.

"K.-B." No. 2

The seed of the above named variety first purchased by the Experiment Station came at a cost of Ten Dollars per bushel. It is indeed a beautiful wheat to look at, though it has not yet given so high yields as several other varieties. The Knight and Bostwick Seed Company, from whom it came, have the following to say:

"During the summer of 1898 we discovered growing in our field of Long Berry Clawson.....a single head of wheat that showed qualities distinctly superior to its celebrated parent.".....We sowed it in our trial grounds.... called it our Celebrated K. B. No. 2."

"There were 49 grains of wheat in this head. The next summer we had two ounces of fine plump wheat, ratio of seed to crop, 113. That summer, 1899, we sowed the two ounces in a trial field, and in 1900 harvested 9½ pounds of seed.....The next summer it was badly hurt by the fly,and partially lost through floods.....but we harvested 273 pounds in 1902."

Thus at different times and by different means, hybridization and selection, or both, have varieties of wheat been established. Some have been introduced from afar, some from places close at hand.

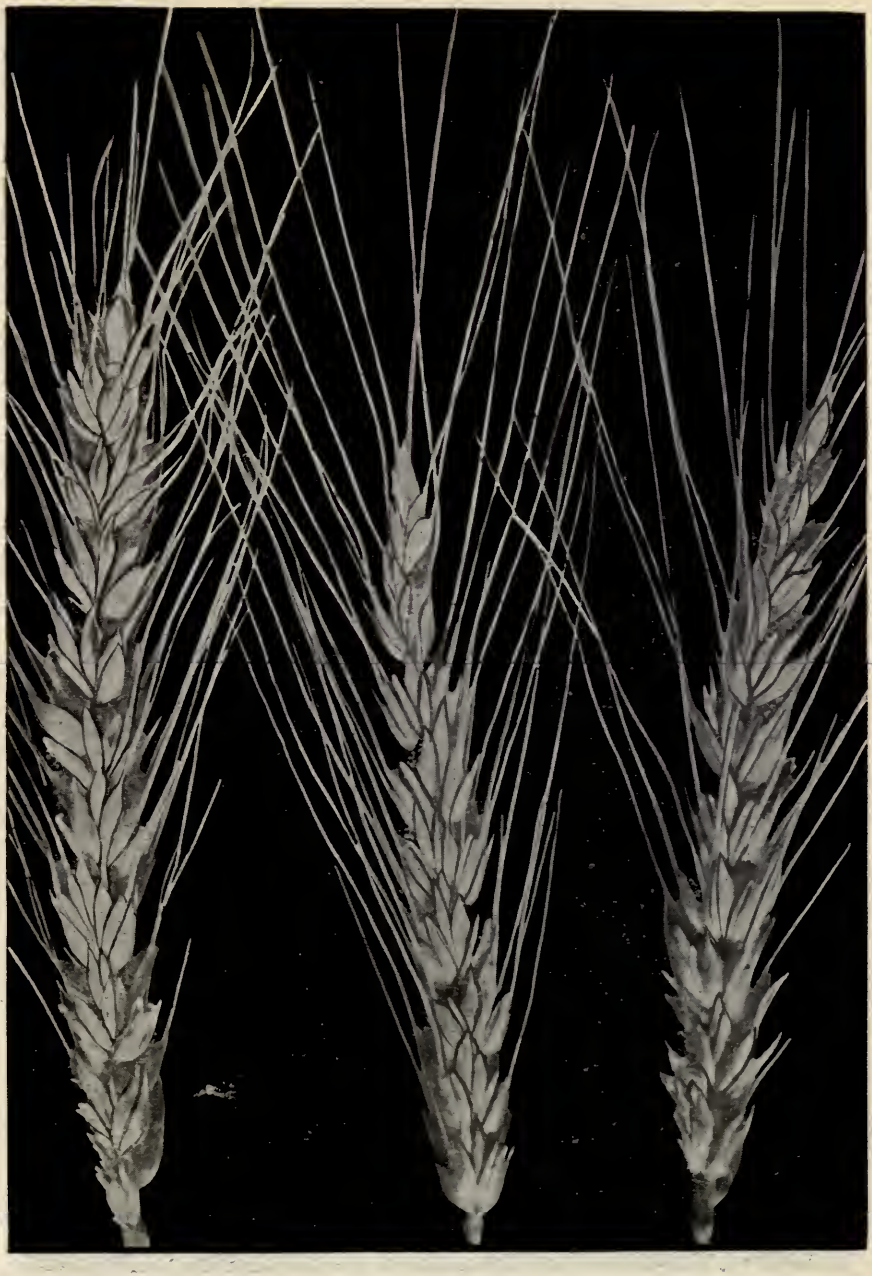

PLATE 4.—FULCASTER. THE HIGHEST YIELDING VARIETY TESTED ON THE CUTLER FIELD.

PLATE 5.—HARVEST KING. HOME-GROWN SEED OF THIS VARIETY GAVE THE SECOND HIGHEST AVERAGE YIELD PER ACRE AT THE CUTLER FIELD.

UNIVERSITY OF ILLINOIS-URBANA
3 0112 078530356